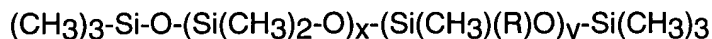
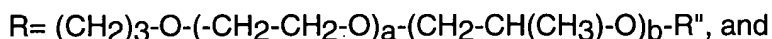


Claims

1. (Currently Amended) In a method for making a rigid polyurethane foam by reacting a polyisocyanate and a polyol in the presence of a urethane catalyst, a blowing agent, optionally water, and a silicone surfactant, the improvement which comprises employing a blowing agent comprising a C4 or C5 hydrocarbon, or mixtures thereof, with an average molecular weight of ≤ 72 g/mole and a boiling point in the range of 27.8 to 50 °C, and 0.5 to 3.5 parts by weight per 100 parts polyol (pphp) of a silicone surfactant comprising a polyether-polysiloxane copolymer represented by the following formula:



where



where R'' is H, $(\text{CH}_2)_z\text{CH}_3$, or C(O)CH_3 ; $x + y + 2$ is ~~60~~ 67-130; x/y is 5 - 14; z is 0-4; the total surfactant molecular weight, based on the formula, is 7000 - 30,000 g/mole, the wt% siloxane in the surfactant is 32 - 70 wt%, the blend average molecular weight (BAMW) of the polyether portion is 450 - 1000 g/mole, and the mole% of ethylene oxide in the polyether portion is 70 - 100 mole%.

2. (Currently Amended) The method of Claim 1 in which $x + y + 2$ is ~~60~~ 67-130; x/y is 5-10; $a + b$ is 10-18; and the mole% of ethylene oxide in the polyether portion is 70-100 mole%.

3. (Original) The method of Claim 1 in which $x + y + 2$ is 90-130; x/y is 10-14; $a + b$ is 10-16; and the mole% of ethylene oxide in the polyether portion is 70-80 mole%.

4. (Currently Amended) The method of Claim 1 in which $x + y + 2$ is ~~60~~ 67-80; x/y is 5-8; $a + b$ is 10-16; and the mole% of ethylene oxide in the polyether portion is 70-100 mole%.

5. (Original) The method of Claim 1 in which $x + y + 2$ is 110-130; x/y is 5-8; $a + b$ is 12-16; and the mole% of ethylene oxide in the polyether portion is 70-80 mole%.

6. (Original) The method of Claim 1 in which the blowing agent comprises cyclopentane, isopentane, isobutane or mixtures thereof.

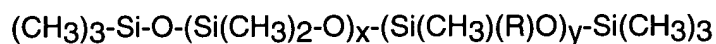
7. (Original) The method of Claim 1 in which the blowing agent comprises a mixture ranging from <100 to 50 wt% cyclopentane and >0 to 50 wt% isopentane, based on C5 components, and optionally also containing butane isomers.

8. (Original) The method of Claim 1 in which the blowing agent also contains a C1-C4 HFC or HCFC with a molecular weight of 50 to 170 g/mole and a boiling point of -60° to +50°C.

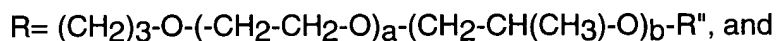
9. (Original) The method of Claim 1 in which the blowing agent also contains HFC-134a, HFC-236ea, HFC-365mfc, HCFC-22 or HFC-245fa.

10. (Original) The method of Claim 1 in which the blowing agent also comprises water at up to 4 pphp.

11. (Original) In a method for making a rigid polyurethane foam by reacting a polyisocyanate and a polyol in the presence of a urethane catalyst, a blowing agent, optionally water, and a silicone surfactant, the improvement which comprises employing a blowing agent comprising a C4 or C5 hydrocarbon, or mixtures thereof, with an average molecular weight of ≤ 72 g/mole and a boiling point in the range of 27.8 to 50 °C, and 0.5 to 3.5 pphp silicone surfactant comprising a polyether-polysiloxane copolymer represented by the following formula:



where



where R'' is H or CH₃; x + y + 2 is 110-130; x/y is 5-8; the total surfactant molecular weight, based on the formula, is 15,000-28,000 g/mole, the wt% siloxane in the surfactant is 34-53 wt%, the blend average molecular weight (BAMW) of the polyether portion is 550-850 g/mole, and the mole% of ethylene oxide in the polyether portion is 70-100 mole%.

12. (Original) The method of Claim 11 in which the blowing agent comprises cyclopentane, isopentane, isobutane or mixtures thereof.

13. (Original) The method of Claim 11 in which the blowing agent comprises a mixture ranging from <100 to 50 wt% cyclopentane and >0 to 50 wt% isopentane, based on C5 components, and optionally also containing butane isomers.

14 (Original) The method of Claim 11 in which the blowing agent also contains a C1-C4 HFC or HCFC with a molecular weight of 50 to 170 g/mole and a boiling point of -60° to +50°C.

15. (Original) The method of Claim 11 in which the blowing agent also contains HFC-134a, HFC-236ea, HFC-365mfc, HCFC-22 or HFC-245fa.

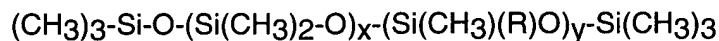
16. (Original) The method of Claim 11 in which the blowing agent also comprises water at up to 4 pphp.

17. (Currently Amended) A rigid polyurethane foam composition comprising the following components in parts by weight (pbw):

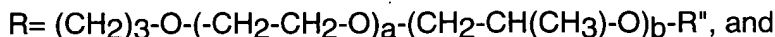
<u>Rigid Foam Formulation</u>	<u>pbw</u>
Polyol	100
Silicone Surfactant	1-3
Blowing Agent	10-20
Water	0-3
Catalyst	0.5-3
Isocyanate Index	80-400

where the blowing agent comprises a C4 or C5 hydrocarbon, or mixtures thereof, with an average molecular weight of ≤ 72 g/mole and a boiling point in the range of 27.8 to 50 °C (82

to 121°F), and the silicone surfactant comprises a polyether-polysiloxane copolymer represented by the following formula:



where



where R'' is H, (CH₂)_zCH₃, or C(O)CH₃; x + y + 2 is 60-130; x/y is 5 - 14; z is 0-4; the total surfactant molecular weight, based on the formula, is 7000 - 30,000 g/mole, the wt% siloxane in the surfactant is 32 - 70 wt%, the blend average molecular weight (BAMW) of the polyether portion is 450 - 1000 g/mole, and the mole% of ethylene oxide in the polyether portion is 70 - 100 mole%.

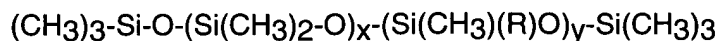
18. (Original) The composition of Claim 17 in which the blowing agent comprises cyclopentane, isopentane, isobutane or mixtures thereof.

19. (Original) The composition of Claim 17 in which the blowing agent comprises a mixture ranging from <100 to 50 wt% cyclopentane and >0 to 50 wt% isopentane, based on C5 components, and optionally also containing butane isomers.

20. (Original) The composition of Claim 17 in which the blowing agent also contains a C1-C4 HFC or HCFC with a molecular weight of 50 to 170 g/mole and a boiling point of -60° to +50°C.

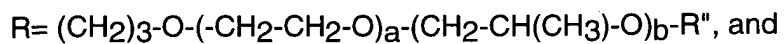
21. (Original) The composition of Claim 17 in which the blowing agent also contains HFC-134a, HFC-236ea, HFC-365mfc, HCFC-22 or HFC-245fa.

22. (Original) The composition of Claim 17 in which the blowing agent comprises a mixture ranging from <100 to 50 wt% cyclopentane and >0 to 50 wt% isopentane, based on C5 components, and optionally also containing butane isomers, and the silicone surfactant is a polyether-polysiloxane copolymer represented by the following formula:



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where



where R'' is H or CH₃; x + y + 2 is 110-130; x/y is 5-8; the total surfactant molecular weight, based on the formula, is 15,000-28,000 g/mole, the wt% siloxane in the surfactant is 34-53 wt%, the blend average molecular weight (BAMW) of the polyether portion is 550-850 g/mole, and the mole% of ethylene oxide in the polyether portion is 70-100 mole%.